CLAIMS

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1- A mechanism CHARACTERISED by permitting, for each lower limb, the near elimination of the use of the calf (4, Fig 42) and/or the anterior leg muscle (23, Fig 43), thus allowing a huge energy savings without the loss of propulsive power DUE TO THE FOLLOWING FUNDAMENTAL DISCOVERY:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; similarly, an increase in the contraction of the anterior leg muscle cannot increase the upward traction on the pedal when the foot is brought up from the rear (the foot being attached to the pedal), the totality of the upward traction on the pedal being created solely by the contraction of the thigh muscles; therefore, one must eliminate as much as possible the use of the calf and the anterior leg muscle, by replacing the pedal by an appropriate mechanism, in order to reduce the energy consumption without the loss of propulsive power.

This FUNDAMENTAL DISCOVERY can be explained as follows: (this explanation concerns the calf; the explanation for the anterior leg muscle is the same, but reversed, the anterior leg muscle being the antagonist of the calf: only the explanation for the calf will be given, that of the anterior leg muscle will be easily understood by a scientist normally competent in the field involved)

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i) from the contraction of the thigh,

and

ii) from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i) the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii) at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii) however, a given force can have only one use; that is the force exerted by the thigh (a, i) is used:

1) to push on the pedal

OR

2) to make the heel into a point of support.

iv) part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in NOT visualizing the force M' (Fig 22).

d) The forces M and M' (Fig 22) cancelling each other, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, this constitutes the FUNDAMENTAL DISCOVERY mentioned at the beginning.

2- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a ring (30, Fig 50) attached at the rear of the shoe,

b) a non-stretch rope (29) attached at the lower end to a ring secured at the rear of the shoe, this rope separating into two parts at the level of the calf, each upper extremities of this rope being respectively secured to two other rings (30) located on either side of the knee joint,

c) three leather straps tying together the two rings located on either side of the knee joint, two straps (31, 32) located on top of the knee, at the top and the bottom of the joint, and the third strap (33) being located behind the knee, in the joint cavity,

this mechanism eliminating the use of the calf.

3- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a ring (30, Fig 49) attached at the front of the shoe,

b) a non-stretch rope (29) attached at the lower end to a ring (30) secured at the front of the shoe, this rope separating into two parts on each side of the leg, each upper extremities of this rope being respectively secured to two other rings (30) located on either side of the knee joint,

c) three leather straps tying together the two rings located on either side of the knee joint, two straps (31, 32) located on top of the knee, at the top and the bottom of the joint, and the third strap (33) being located behind the knee, in the joint cavity,

this mechanism eliminating the use of the anterior tibial muscle when the foot pulls the pedal upwards, at the condition that the foot is attached to the pedal by a strap (24).

4- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a form (34, fig 53) made of a rigid material which moulds the shape of the foot and of the bottom of the leg (excluding the tip of the foot which rests on the pedal),

b) another form (35, fig 53) made of a rigid material which moulds the shape of the foot and of the bottom of the leg (excluding the tip of the foot which rests on the pedal),

c) the forms described in a) and b) being tied by two rotation joints (36), the first one at the top of the part and the second at the heel level,

d) the forms described in a) and b) closing perfectly on the foot and the bottom of the leg (fig 52), the said mechanism totally preventing the rotation of the heel articulation (1, fig 52), thus allowing:

i) the elimination of the use of the calf during the descending phase,

ii) the elimination of the use of the anterior tibial muscle during the ascending phase (when the foot goes up from the rear), at the condition that the foot is attached to the pedal by a strap (24, fig 52).

5- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a rigid triangle a side of which (37, fig 56) is attached to the rear of the platform (21) and on its side, the other side (38) of the rigid triangle being attached at the center of the platform (21) and on its side,

b) an L-shaped rigid rod (40) the vertical part of which is attached at the center of the triangle, at its extremity,

c) the vertical portion of the L-shaped rod (40) sliding in the hole of part (39, fig 58), this part (39) rotating freely in the axis (15) at the extremity of the crankset's crank, where the pedal was prior being removed,

d) a weak compression spring (41, fig 56) located along the vertical portion of the L-shaped rod (40),

e) the horizontal portion of the L-shaped rod (40) being inserted in the hole (27, fig 45) located in the heel of the special shoe (28, fig 45),

the said mechanism functioning as follows:

i) during the descending phase (fig 59), the vertical portion of the L-shaped rigid rod (40) goes down the hole of part (39), spring (41) being compressed, thus placing the axis of rotation of the heel (1, fig 60) UNDER the axis of rotation (15, where the removed pedal was located), thus creating a STABLE equilibrium, and avoiding the contraction of the calf during this descending phase,

ii) during the ascending phase (fig 56), the vertical portion of the L-shaped rod (40) goes up the hole of part (39), spring (41) being released, thus resulting in the axis of the horizontal portion of part (40) located in the hole (27) of the shoe's heel COINCIDE EXACTLY with the axis of rotation (15, fig 56 and 57), creating a STABLE equilibrium, thus avoiding the contraction of the anterior tibial muscle during this ascending phase.

6- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a rectangular base (50, fig 72 and 73),

b) two vertical parts (s1 and s2) attached on the base (50) at the top of which is attached an axle bearing two wheels (44 and 47) integral with each other,

c) two vertical parts (s3 and s4) attached to the base (50) at the top of which is attached an axle bearing two wheels (46 and 48) integral with each other,

d) two vertical parts (s5 and s6) attached to the base (50) at the top of which is attached an axle bearing three wheels, the wheels (51 and 52) being of the same dimensions, the large wheel (49) symbolizing the rear traction wheel of a bicycle, the rotation of wheels (51) and/or (52) creating the rotation of wheel (49) in the same direction,

e) a traction chain (ch 47) tying wheel (47) to the wheel (52),

f) a traction chain (ch 48) tying wheel (48) to the wheel (51),

g) four steel rods (t1, t2, t3 and t4, fig 72 and 73) attached vertically on the base (50), these 4 rods being able to slide in the cubic part (42) thanks to four holes drilled vertically at the four corners of part (42),

h) a rigid part (21, fig 74) having the shape of a platform for the foot, under which is attached an uneven Z-shaped form,

i) the uneven Z-shaped form going back and forth inside the cubic part (42) thanks to two holes drilled at the top and bottom of the cubic part (42),

j) two springs (r1 and r2) being alternatively compressed and released while the uneven Z-shaped form goes back and forth, up and down inside the cubic part (42),

k) a T-shaped part (43, fig 72) the vertical portion of which bears gear teeth which can be inserted in those of wheel (44), the horizontal portion of part (43) being able to slide back and forth on the side of the cubic part (42) and bearing a compression spring (r3) which keeps the vertical portion of part (43) against the side of cubic part (42) when this part (43) is not in contact with the uneven Z-shaped form (21) which goes back and forth vertically inside the cubic part (42),

l) a T-shaped part (45, fig 72) the vertical portion of which bears gear teeth which can be inserted in those of wheel (46), the horizontal portion of part (45) being able to slide back and forth on the side of the cubic part (42) and bearing a compression spring (r4) which keeps the vertical portion of of part (45) against the side of cubic part (42) when this part (45) is not in contact with the uneven Z-shaped form (21) which goes back and forth vertically inside the cubic part (42),

the said mechanism functionning as follows:

i- during the descending phase (fig 72), spring (r2) is compressed, the uneven Z-shaped form comes in contact with the inclined portion at the extremity of the horizontal portion of part (45), thus pushing part (45) to the right, the toothed portion of the vertical portion of part (45) engaging with the teeth of wheel (46); since part (42) slides downward along the 4 rods (t1, t2, t3 and t4), part (45)also moves downward, thus rotating wheels (46 and 48) in a counterclockwise direction, thus rotating wheels (51 and 49) in the same direction thanks to chain (ch 48),

ii- during the ascending phase (fig 75), which occurs thanks to parts 25 and/or 26 (according to the concept of fig 44), spring (r1) is compressed, the uneven Z-shaped form comes in contact with the inclined portion at the extremity of the horizontal portion of part (43), thus pushing part (43) to the left, the toothed portion of the vertical portion of part (43) engaging with the teeth of wheel (44); since part (42) slides upward along the 4 rods (t1, t2, t3 and t4), part (43)also moves upward, thus rotating wheels (44 and 47) in a counterclockwise direction, thus rotating wheels (52 and 49) in the same direction thanks to chain (ch 47),

the said mechanism, IN ADDITION to eliminating the use of the calf and of the anterior leg muscle, allows ADDITIONAL energy savings thanks to the two following facts:

1- muscles often consume energy WITHOUT producing mechanical work because of the neutral (dead) points at the top and bottom in the case of a circular crankset, the applied force cannot produce a torque on the crank (therefore no rotation of the crankset); thanks to the VERTICAL displacement of the foot and because of the fact that the applied force is ALWAYS TANGENT to the toothed wheels 44 and/or 46, the said mechanism does NOT have any neutral (or dead) points: consequently, there is no waste of this kind of energy, the muscular contraction being ALWAYS accompanied by EFFECTIVELY PRODUCED mechanical work;

2- the said mechanism MINIMIZES the use of muscles having a STRONG degree of leverage, such as the quadriceps and the bend of the knee, and MAXIMIZES the use of muscles having a WEAK degree of leverage, such as the gluteal and the iliopsoas.

7- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, Fig 79) the front end of which is secured to the rotation axis (15) at the end of the pedal crank, where was the pedal which has been removed;

b) a rotation axis (59, Fig 80) secured to the horizontal tube of the frame which supports the rear wheel;

c) a crank (53, Fig 79 and 80), of the same length as that of the pedal crank and always moving inparallel with it, this crank (53) rotating freely around the rotation axis (59);

d) an horizontal part (54) attaching the top extremities of crank (53) and the crankset's crank (15), thus always allowing the parallel movement of these two cranks (which are of the same lenght);

e) a part (55, fig 80) having a star-shaped hole inserted in the star-shaped axle (60) at the top of part (53); this part (55) is therefore integral of the crank (53) and the star-shaped hole allows to CHOOSE the angle between parts (55) and (53), this angle remaining the same during the rotation of the mechanism;

f) a part (57) adjustable to the desired position in the groove of part (55, fig 80), thus allowing to CHOOSE the length of the combined part (55 + 57);

g) an axis of rotation attached at the extremity of part (57) which is inserted in the hole of part (56, fig 80);

h) a part (58) adjustable to the desired position in the groove of part (56, fig 80), thus allowing to CHOOSE the length of the combined part (56 + 58);

i) an axis of rotation attached at the extremity of part (58) which is inserted in the rotation hole attached at the rear of the platform (21),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76 and 77) when the foot comes up from the rear.

8- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21) attached to the axis of rotation (15) at the top of the crankset's crank;

b) a toothed wheel (62) the center of which coincides with the crankser's axis of rotation, and is integral with the crankset's crank (the wheel 62 rotates WITH the crank);

c) a traction chain (63) which ties together wheel (62) and the toothed cam (67), the wheel (62) and cam (67) having the same circumference (same number of teeth);

d) an axle (65), the cam (67) being welded to one extremity of this axle, and the crank (66) being welded to the axle's (65) other extremity, in such a way that the cam (67) rotates WITH the crank (66);

e) a part (64), attached to the bike's lower frame tube, and supporting axle (65);

f) a rigid rod (68) one extremity of which bears a point of rotation (70) located at the rear of the platform (21), the other extremity bearing another point of rotation (69) located at the moving extremity of the the crank (66),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

9- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, fig 82) attached from the front to the axis of rotation (15) of the crankset's crank;

b) a crank (73) attached to the axis of rotation (72) of part (71) attached to the bike's lower frame tube,

c) the crank (73) being of the same lenght and always parallel to the crankset's crank thanks to part (74) which ties the axis of rotation (15) to axis of rotation (75) located at the moving extremity of crank (73);

d) a cam (76), which is not toothed, INTEGRAL with crank (73), i.e. parts 76 and 73 form a SINGLE part (76 + 73);

e) a wheel (77) attached on the side and at the rear of platform (21), the circumference of this wheel (77) being in frictional CONTACT with the circumference of the cam (76), in such a way that, when the mechanism rotates, the wheel (77) makes a COMPLETE ROTATION of the cam (76) by rolling along the circumference of the latter,

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

10- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, fig 83) attached from the front to the top axis of rotation of the crankset's crank;

b) a cam (78) solidly attached (it does not rotate) to the bike's lower frame tube by a support (83), this cam having a groove along its circumference inside of which moves a wheel (82);

c) this wheel (82) rotating on the lower elbowed portion of rod (81), the top elbowed portion of the rod (81) (reversed from the lower elbowed portion) being inserted in an axis of rotation (84) located at the rear of the platform (21);

d) the part elbowed at the two extremities (81) going back and forth (during the rotation of the mechanism) inside a hole located at the top extremity of part (79);

e) this part (79) (which bears rod 81 and wheel 82) rotating around axis of rotation (80) located on cam (78),

the said mecanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

11- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, fig 84) the front of which is attached to the top axis of rotation (15) of the crankset's crank;

b) a first rod (87) of the same length as that of the crankset's crank, an extremity of which is attached to an axis of rotation (88) located on the lower frame tube, the other extremity being attached to a point of rotation (91) located on the uneven L-shaped elbowed part (89);

c) a second rod (85) one extremity of which rotates freely on an axis of rotation (86) which coincides with the rear wheel's axis, the other extremity being attached to a point of rotation (90) located at one extremity of the uneven L-shaped elbowed part (89);

d) the other extremity of this part (89) being attached to an axis of rotation (92) located at the rear of the platform (21);

e) the distance between rotation points (90) and (91) and the length of rod (85) chosen such that, when rod (87) makes a COMPLETE ROTATION, rod (85) does NOT make a complete rotation but rather GOES BACK AND FORTH (angles 1 and 2, fig 84) with respect to the imaginary vertical (V),

the said mecanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

12- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, fig 85) the front of which is attached to the axis of rotation (15) of the crankset's crank;

b) a rigid support (93) placed in a fixed position along the bike's lower frame tube;

c) part (93) having an encrusted groove inside of which a wheel (94) goes back and forth, this groove being in a straight line along the tube axis;

d) a rigid rod (95), an extremity of which is bearing the axis of rotation of wheel (94), the other extremity of this rod (95) being attached to an axis of rotation (99) located at the rear of the platform (21);

e) another rigid rod (96) one extremity of which is attached to an axis of rotation (97) located at the front of part (93), the other extremity of rod (96) being attached to a fixed axis of rotation (98) located near the center of rod (95),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

13- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, fig 86) the front of which is attached to the extremity of the axis of rotation (15) of the crankset's crank;

b) a curved part of irregular shape (100) being integral with the platform (21), the top curved portion of this part (100) going back and forth between

c) two small wheels (102) which rest against the two borders of part (100);

d) these two small wheels (102) being tied together by two rectangular parts (101) located on each side of the two wheels (102) thanks to two axis of rotation (W);

e) the rectangular part (101), located between the bike's frame tube and the wheels (102), being attached AT ITS CENTER to the bike's frame tube thanks to an axis of rotation (Z), thus allowing the combined part (101 plus 102) TO ROTATE around the axis Z when the crankset rotates, thus keeping a TANGENT (90 degrees) contact between the two wheels (102) and the two borders of part (100) which goes back and forth between the two wheels (102),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

14- A mechanism according to claim 1, CHARACTERISED by the following components:

a) a platform (21, fig 88) the front of which is attached to the extremity of the axis of rotation (15) of the crankset's crank;

b) an axle (109), which is the axis of rotation (15), and which is made as follows:

i- part (b, fig 87) of axle (109) rotates freely in part (b) at the tip of the crank which holds roller bearings;

ii- the square portion of axle (109, fig 87) is inserted in the square hole at the front of the platform (21);

iii- the grooved portion (a) of axle (109) is inserted in the grooved part (a) of cam (104), thus allowing

1- to CHOOSE the degree of inclination of the platform (21) with respect to cam (104), and

2- to make integral cam (104), axle (109) and the platform (21) as if they were a SINGLE PART;

c) a wheel (103) welded to the crankset's case, this wheel NOT BEING ABLE TO ROTATE (it is the chain 105 which goes around this wheel 103 when the crankset rotates);

d) a traction chain (105) tying the cam (104) with wheel (103), both of them having the same circumference (same number of teeth);

e) a chain tightener (106) with spring (107) which maintains a minimum tension in the top portion of chain (105), given that it is always the bottom portion of the chain which provides the propulsive tension,

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear.

15- A mechanism according to claims 6, 7, 8, 9, 10, 11, 12, 13 and 14, CHARACTERISED insofar as the platform (21, fig 44) having part (25, fig 44)

a) which is very rigid but well padded on the inside;

b) which is attached on the inside of the platform (21), thus facilitating the retrieval of the foot from the other side and/or from the rear, and the easy repositioning of the foot without having to look (with a bit of practice);

c) which covers the foot in the area near the leg, in such a way as to maintain the heel IN CONTACT with the platform when the thigh pulls upward during the ascending phase (when the foot goes up from the rear),

the said mechanism allowing to avoid the contraction of the anterior tibial muscle (23, fig 43) when the iliopsoas (22, fig 43) pulls the platform (21) upwards, thus bringing a large energy savings and provides the opportunity to utilize the iliopsoas TO ITS FULL POTENTIAL since,with a pedal and the foot attached to it, the contraction of the anterior tibial muscle LIMITS the contraction force of the iliopsoas, the anterior tibial muscle being a weak muscle (compared to the calf); in addition, the said mechanism allows the simultaneous use of both legs, resulting in a larger potential propulsive power.

16- A mechanism according to claims 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14, CHARACTERISED insofar as the platform (21, fig 44 and 46) having an horizontal axle (26, fig 44 and 46)

a) which is inserted in the hole (27, fig 45) in the heel of a special shoe (28, fig 45),

b) the axis of rotation thus created (27, 26, fig 46) being located exactly under (vertically) the axis of rotation of the ankle (1, fig 46),

the said mechanism allowing to avoid the contraction of the anterior tibial muscle (23, fig 43) when the iliopsoas (22, fig 43) pulls the platform (21) upwards, thus bringing a large energy savings and provides the opportunity to utilize the iliopsoas TO ITS FULL POTENTIAL since, with a pedal and the foot attached to it, the contraction of the anterior tibial muscle LIMITS the contraction force of the iliopsoas, the anterior tibial muscle being a weak muscle (compared to the calf); in addition, the said mechanism allows the simultaneous use of both legs, resulting in a larger potential propulsive power.

END OF CLAIMS

Art 19 Amendments

CLAIMS

1. A mechanism according to claim 1, CHARACTERISED by the following components:

   a) a ring (30, fig 50) attached to the rear of the shoe,

   b) a non-stretchable rope (29) attached at the bottom to the ring attached to the rear of the shoe, this rope splitting into two parts at the level of the calf, each extremity at the top of this rope being respectively tied to two other rings (30) located on each side of the knee joint,

   c) three leather straps tying together the two rings located on each side of the knee joint, two straps (31, 32) located on top of the knee, at the top and bottom of the joint, and the third strap (33) located behind the knee, in the joint pit,

this mechanism allowing the elimination of the use of the calf, the said mechanism being **USEFUL** due to the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i- from the contraction of the thigh,

and

ii- from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i- the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii- at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii- However, a given force can have only one use; that is the force exerted by the thigh (a, i) is used:

1) to push on the pedal

OR

2) to make the heel into a point of support.

iv- part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in NOT visualizing the force M' (Fig 22).

e) the forces M and M' (Fig 22) cancelling each other, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, thanks to the two rope mechanism (fig 50), the contraction of the calf is avoided, thus resulting in a considerable energy savings without the loss of the propulsive power since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

2. A mechanism according to claim 1, CHARACTERISED by the following components:

a) a ring (30, fig 49) attached to the front of the shoe,

b) a non-stretchable rope (29) attached at the bottom to the ring (30) attached to the front of the shoe, this rope splitting into two parts at the level of the calf, each extremity at the top of this rope being respectively tied to two other rings (30) located on each side of the knee joint,

c) three leather straps tying together the two rings located on each side of the knee joint, two straps (31, 32) located on top of the knee, at the top and bottom of the joint, and the third strap (33) located behind the knee, in the pit of the joint, three leather straps tying together the two rings located on each side of the knee joint, two straps (31, 32) located on top of the knee, at the top and bottom of the joint, and the third strap (33) located behind the knee, in the pit of the joint,

this mechanism allowing the elimination of the use of the anterior leg muscle when the foot pulls upwards on the pedal, at the condition that the foot is attached to the pedal with a strap (24), the mechanism being **USEFUL** due to the following **FUNDAMENTAL DISCOVERY**:

an increase of the contraction of the anterior leg muscle (23, fig 40 and 43) cannot increase the upward traction on the pedal during the ascending phase (fig 39) if the tip of the foot is attached to the pedal, the totality of the upward traction on the pedal coming only from the of the iliopsoas (22, fig 40 and 43) and the thigh muscle; consequently, one must eliminate as much as possible the use of the anterior tibial muscle by using the 2 ropes (fig 49);

this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the upward traction on the pedal during the ascending phase comes from two sources:

i- from the contraction of the thigh's iliopsoas muscle which pulls the thigh upwards,

and

ii- from the contraction of the anterior leg muscle which pulls the tip of the foot upwards thanks to the strap (24, fig 49),

b) part a) i is true while part a) ii is false, being an optical illusion,

c) this optical illusion can be explained as follows:

i- the force described in a) ii requires a point of support to be applied, this point of support can only be created by the force described in a) i , this force being used to make the heel into a point of support,

ii- at the same time, the world-wide interpretation says that the force described in a) i is also used to pull the pedal upwards,

iii- however, a given force can only have **one single use**; the force applied by the thigh (a) i) is either used to:

1- pull the pedal upwards,

OR

2- makes the hell into a point of support such that the force (a) ii) can be applied,

iv- part iii-1 is true and part iii-2 is false because of a second optical which consists of **NOT** visualize the force that the anterior leg muscle (23, fig 43) applies on the knee (13, fig 43), **this force pulling the knee downward**; indeed, the anterior leg muscle is attached at its **two extremities**: the **lower** point of attachment being located a distance (average) D from the heel (fig 43), and the **upper** point of attachment being the knee (average); therefore, the anterior leg muscle, by contracting, pulls the tip of the foot **upwards**, and **at the same time**, pulls the knee **downwards**: these 2 forces are of equal intensity, **of opposite direction**, and have the same line of action: therefore, **they cancel each other** (as the forces M and M' of fig 22, concerning the calf);

d) the two forces described in iv cancelling each other, it becomes evident that the contraction of the anterior leg muscle (23, fig 43) cannot pull the pedal upwards, and consequently, the totality of the upward traction can only come from the thigh's iliopsoas muscle; therefore, by using the two rope system (fig 49) the contraction of the anterior leg muscle is avoided, thus allowing a considerable energy savings without losing propulsive upward traction since the anterior leg muscle, if contracted, could not increase the upward traction on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** quoted at the beginning.

3- A mechanism CHARACTERISED by the following components:

a) a platform (21, Fig 79) the front end of which is secured to the rotation axis at the extremity of the pedal crank, where the pedal was when it was removed;

b) a rotation axis (59, Fig 80) secured to the horizontal tube of the frame which supports the rear wheel;

c) a crank (53, Fig 79 and 80), of the same length as that of the pedal crank and always moving in parallel with it, this crank (53) rotating freely around the rotation axis (59);

d) an horizontal part (54) attaching the top extremities of crank (53) and the crankset's crank (15), thus always allowing the parallel movement of these two cranks (which are of the same length);

e) a part (55, fig 80) having a star-shaped hole inserted in the star-shaped axle (60) at the top of part (53); this part (55) is therefore integral of the crank (53) and the star-shaped hole allows to CHOOSE the angle between parts (55) and (53), this angle remaining the same during the rotation of the mechanism;

f) a part (57) adjustable to the desired position in the groove of part (55, fig 80), thus allowing to CHOOSE the length of the combined part (55 + 57);

g) an axis of rotation attached at the extremity of part (57) which is inserted in the hole of part (56, fig 80);

h) a part (58) adjustable to the desired position in the groove of part (56, fig 80), thus allowing to CHOOSE the length of the combined part (56 + 58);

i) an axis of rotation attached at the extremity of part (58) which is inserted in the rotation hole attached at the rear of the platform (21),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76 and 77) when the foot comes up from the rear, the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i- the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in NOT visualizing the force M' (Fig 22).

d) the forces M and M' (Fig 22) cancelling each other, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings without the loss of the propulsive power since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

4- A mechanism CHARACTERISED by the following components:

a) a platform (21) attached to the axis of rotation (15) at the top of the crankset's crank;

b) a toothed wheel (62) the center of which coincides with the crankser's axis of rotation (the wheel 62 rotates with the crank);

c) a traction chain (63) which ties together wheel (62) and the toothed cam (67), the wheel (62) and cam (67) having the same circumference (same number of teeth);

d) an axle (65), the cam (67) being welded to one extremity of this axle, and the crank (66) being welded to the axle's (65) other extremity, in such a way that the cam (67) rotates with the crank (66);

e) a part (64), attached to the bike's lower frame tube, and supporting axle (65);

f) a rigid rod (68) one extremity of which bears a point of rotation located at the rear of the platform (21), the other extremity bearing another point of rotation (69) located at the moving extremity of the crank (66),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear. the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i - the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22).

d) the forces M and M' (Fig 22) cancelling each other, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

5- A mechanism CHARACTERISED by the following components:

a) a platform (21, fig 82) attached from the front to the axis of rotation (15) of the crankset's crank;

b) a crank (73) attached to the axis of rotation (72) of part (71) attached to the bik's lower frame tube,

c) the crank (73) being of the same lenght and always parallel to the crankset's crank thanks to part (74) which ties the axis of rotation to the axis of rotation (75) located at the moving extremity of crank (73);

d) a cam (76), which is not toothed, integral with crank (73), i.e. parts 76 and 73 form a single part (76 + 73);

e) a wheel (77) attached on the side and at the rear of platform (21), the circumference of this wheel (77) being in frictional contact with the circumference of the cam (76), in such a way that, when the mechanism rotates, the wheel (77) makes a complete rotation of the cam (76) by rolling along the circumference of the latter,

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear. the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i - the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22).

d) the forces M and M' (Fig 22) cancelling each other, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

6- A mechanism CHARACTERISED by the following components:

a) a platform (21, fig 83) attached from the front to the top axis of rotation of the crankset's crank;

b) a cam (78) solidly attached (it does not rotate) to the bike's lower frame tube by a support (83), this cam having a groove along its circumference inside of which moves a wheel (82);

c) this wheel (82) rotating on the lower elbowed portion of rod (81), the top elbowed portion of the rod (81) (reversed from the lower elbowed portion) being inserted in an axis of rotation (84) located at the rear of the platform (21);

d) the part elbowed at the two extremities (81) going back and forth (during the rotation of the mechanism) inside a hole located at the top extremity of part (79),

e) this part (79) (which bears rod 81 and wheel 82) rotating around axis of rotation (80) located on cam (78),

the said mecanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear, the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i - the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22);

d) the forces M and M' (Fig 22) **cancelling each other**, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

7- A mechanism CHARACTERISED by the following components:

a) a platform (21, fig 84) the front of which is attached to the top axis of rotation (15) of the crankset's crank;

b) a first rod (87) of the same length as that of the crankset's crank, an extremity of which is attached to an axis of rotation (88) located on the lower frame tube, the other extremity being attached to a point of rotation (91) located on the uneven L-shaped elbowed part (89);

c) a second rod (85) one extremity of which rotates freely on an axis of rotation (86) which coincides with the rear wheel's axis, the other extremity being attached to a point of rotation (90) located at one extremity of the uneven L-shaped elbowed part (89);

d) the other extremity of this part (89) being attached to an axis of rotation (92) located at the rear of the platform (21);

e) the distance between rotation points (90) and (91) and the length of rod (85) chosen such that, when rod (87) makes a complete rotation, rod (85) does not make a complete rotation but rather goes back and forth (angles 1 and 2, fig 84) with respect to the imaginary vertical (V),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear, the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i - the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22);

d) the forces M and M' (Fig 22) **cancelling each other**, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

8- A mechanism CHARACTERISED by the following components:

a) a platform (21, fig 85) the front of which is attached to the axis of rotation (15) of the crankset's crank;

b) a rigid support (93) placed in a fixed position along the bike's lower frame tube;

c) part (93) having an incrusted groove inside of which a wheel (94) goes back and forth, this groove being in a straight line along the tube axis;

d) a rigid rod (95), an extremity of which is bearing the axis of rotation of wheel (94), the other extremity of this rod (95) being attached to an axis of rotation (99) located at the rear of the platform (21);

e) another rigid rod (96) one extremity of which is attached to an axis of rotation (97) located at the front of part (93), the other extremity of rod (96) being attached to a fixed axis of rotation (98) located near the center of rod (95),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear, the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion.

c) this optical illusion can be explained as follows:

i - the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22);

d) the forces M and M' (Fig 22) **cancelling each other**, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

9- A mechanism CHARACTERISED by the following components:

a) a platform (21, fig 86) the front of which is attached to the extremity of the axis of rotation (15) of the crankset's crank;

b) a curved part of irregular shape (100) being integral with the platform (21), the top curved portion of this part (100) going back and forth between

c) two small wheels (102) which rest against the two borders of part (100);

d) these two small wheels (102) being tied together by two rectugular parts (101) located on each side of the two wheels (102) thanks to two axis of rotation (W);

e) the rectangular part (101), located between the bike's frame tube and the wheels (102), being attached AT ITS CENTER to the bike's frame tube thanks to an axis of rotation (Z), thus allowing the combined part (101 plus 102) TO ROTATE around the axis Z when the crankset rotates, thus keeping a TANGENT (90 degrees) contact between the two wheels (102) and the two borders of part (100) which goes back and forth between the two wheels (102),

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear, the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i - from the contraction of the thigh,

and

ii - from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion,

c) this optical illusion can be explained as follows:

i - the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii - at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii - however, a given force can have **only one use**;

that is the force exerted by the thigh (a, i) is used:

1 - to push on the pedal

OR

2 - to make the heel into a point of support.

iv - part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22);

d) the forces M and M' (Fig 22) **cancelling each other**, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

10- A mechanism CHARACTERISED by the following components:

a) a platform (21, fig 88) the front of which is attached to the extremity of the axis of rotation (15) of the crankset's crank;

b) an axle (109), which is the axis of rotation (15), and which is made as follows:

i- part (b, fig 87) of axle (109) rotates freely in part (b) at the tip of the crank which holds roller bearings;

ii- the square portion of axle (109, fig 87) is inserted in the square hole at the front of the platform (21);

iii- the grooved portion (a) of axle (109) is inserted in the grooved part (a) of cam (104), thus allowing

1- to CHOOSE the degree of inclination of the platform (21) with respect to cam (104), and

2- to make integral cam (104), axle (109) and the platform (21) as if they were a SINGLE PART;

c) a wheel (103) welded to the crankset's case, this wheel NOT BEING ABLE TO ROTATE (it is the chain 105 which goes around this wheel 103 when the crankset rotates);

d) a traction chain (105) tying the cam (104) with wheel (103), both of them having the same circumference (same number of teeth);

e) a chain tightener (106) with spring (107) which maintains a minimum tension in the top portion of chain (105), given that it is always the bottom portion of the chain which provides the propulsive tension,

the said mechanism allowing the control in the increase of the angle of inclination of the foot with respect to the ground (angle , fig 76) when the foot comes up from the rear, the said mechanism being **USEFUL** because of the following **FUNDAMENTAL DISCOVERY**:

an increase in the contraction of the calf cannot increase the pressure on the pedal, the totality of the pressure on the pedal being created only by the contraction of the thigh muscles; consequently, one must eliminate as much as possible the use of the calf by replacing the pedal by the said mechanism, this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the pressure on the pedal comes from two sources:

i- from the contraction of the thigh,

and

ii- from the contraction of the calf which pulls the heel upwards, thus rotating the foot around the heel (1, Fig 7), thus producing a downward pressure on the pedal.

b) part a) i is true while part a) ii is false, being an optical illusion,

c) this optical illusion can be explained as follows:

i- the force described in a) ii requires a point of support in order to be applied, this point of support cannot be created by the force described in a) i, this force being used to make the heel into a point of support,

ii- at the same time, the world-wide interpretation is that the force described in a) i is also used to push on the pedal.

iii- however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used: however, a given force can have **only one use**; that is the force exerted by the thigh (a, i) is used:

1- to push on the pedal

OR

2- to make the heel into a point of support.

iv- part iii-1 is true and part iii-2 is false due to the second optical illusion which consists in **NOT** visualizing the force M' (Fig 22);

d) the forces M and M' (Fig 22) **cancelling each other**, it becomes evident that the contraction of the calf cannot increase the pressure on the pedal, and consequently, the totality of the pressure on the pedal can only come from the thigh muscles, therefore, by replacing the pedal by a platform supporting the heel, the calf contraction being avoided, thus resulting in a considerable energy savings **without the loss of the propulsive power** since the calf, if it contracted, could not increase the pressure on the pedal, this constitutes the **FUNDAMENTAL DISCOVERY** mentioned at the beginning.

11- A mechanism according to claims 3, 4, 5, 6, 7, 8, 9 and 10, CHARACTERISED insofar as the platform (21, fig 44) having part (25, fig 44)

a) which is very rigid but well padded on the inside;

b) which is attached on the inside of the platform (21), thus facilitating the retrieval of the foot from the other side and/or from the rear, and the easy repositioning of the foot without having to look (with a bit of practice);

c) which covers the foot in the area near the leg, in such a way as to maintain the heel IN CONTACT with the platform when the thigh pulls upward during the ascending phase (when the foot goes up from the rear),

the said mechanism allowing to avoid the contraction of the anterior tibial muscle (23, fig 43) when the iliopsoas (22, fig 43) pulls the platform (21) upwards, thus providing the opportunity to utilize the iliopsoas To ITS FULL power since, with a pedal and the foot attached to it, the contraction of the anterior tibial muscle **limits** the contraction force of the iliopsoas, the anterior tibial muscle being a **weak** muscle (compared to the calf); in addition, the said mechanism allows the simultaneous use of both legs, resulting in a larger potential propulsive power.

The mechanism being **USEFUL** due to the following **FUNDAMENTAL DISCOVERY**:

an increase of the contraction of the anterior leg muscle (23, fig 40 and 43) cannot increase the upward traction on the pedal during the ascending phase (fig 39) if the tip of the foot is attached to the pedal, the totality of the upward traction on the pedal coming only from the of the iliopsoas thigh muscle (22, fig 40 and 43); consequently, one must eliminate as much as possible the use of the anterior leg muscle by using part 25, fig 44 (and 46), in combination with the platform (21, fig 44 and 46); this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the upward traction on the pedal during the ascending phase comes from two sources:

i- from the contraction of the thigh's iliopsoas muscle which pulls the thigh upwards,

and

ii- from the contraction of the anterior leg muscle which pulls the tip of the foot upwards thanks to the strap (24, fig 49),

b) part a) i is true while part a) ii is false, being an optical illusion,

c) this optical illusion can be explained as follows:

i- the force described in a) ii requires a point of support to be applied, this point of support can only be created by the force described in a) i , this force being used to make the heel into a point of support,

ii- at the same time, the world-wide interpretation says that the force described in a) i is also used to pull the pedal upwards,

iii- however, a given force can only have **one single use**; the force applied by the thigh (a) i) is either used to:

1- pull the pedal upwards,

OR

2- makes the hell into a point of support such that the force (a) ii) can be applied,

iv- part iii-1 is true and part iii-2 is false because of a second optical which consists of **NOT** visualize the force that the anterior leg muscle (23, fig 43) applies on the knee (13, fig 43), **this force pulling the knee downward**; indeed, the anterior leg muscle is attached at its **two extremities**: the **lower** point of attachment being located a distance (average) D from the heel (fig 43), and the **upper** point of attachment being the knee (average); therefore, the anterior leg muscle, by contracting, pulls the tip of the foot **upwards**, and **at the same time**, pulls the knee **downwards**: these 2 forces are of equal intensity, **of opposite direction**, and have the same line of action: therefore, **they cancel each other** (as the forces M and M' of fig 22, concerning the calf);

d) the two forces described in iv cancelling each other, it becomes evident that the contraction of the anterior leg muscle (23, fig 43) cannot pull the pedal upwards, and consequently, the totality of the upward traction can only come from the thigh's iliopsoas muscle; therefore, by using part 25, fig 44, the contraction of the anterior leg muscle is avoided, thus allowing:

A- a considerable energy savings without losing propulsive upward traction since the anterior leg muscle, if contracted, could not increase the upward traction on the pedal

B- the use of the iliopsoas **to its full power**, since, the anterior leg muscle being **much weaker** than the calf, the use of strap 24 **alone** (fig 49), **without** the 2 ropes, imposes a **lower limit** to the upward traction that the iliopsoas can apply,

C- the **power** potentially doubled, since the 2 legs are used **simultaneously**: part 25 (fig 44) during the ascending phase (which eliminates the use of the anterior leg muscle and frees the full power of the iliopsoas) **in addition to** the platform itself during the descending phase (which eliminates the use of the calf), this constitutes the **FUNDAMENTAL DISCOVERY** quoted at the beginning.

12- A mechanism according to claims 3, 4, 5, 6, 7, 8, 9 and 10, CHARACTERISED insofar as the platform (21, fig 44 and 46) having an horizontal axle (26, fig 44 and 46)

a) which is inserted in the hole (27, fig 45) in the heel of a special shoe (28, fig 45),

b) the axis of rotation thus created (27, 26, fig 46) being located exactly under (vertically) the axis of rotation of the ankle (1, fig 46),

the said mechanism allowing to avoid the contraction of the anterior tibial muscle (23, fig 43) when the iliopsoas (22, fig 43) pulls the platform (21) upwards, thus bringing a large energy savings and provides the opportunity to utilize the iliopsoas To ITS FULL POTENTIAL since, with a pedal and the foot attached to it, the contraction of the anterior tibial muscle limits the contraction force of the iliopsoas, the anterior tibial muscle being a weak muscle (compared to the calf); in addition, the said mechanism allows the simultaneous use of both legs, resulting in a larger potential propulsive power;

the mechanism being **USEFUL** due to the following **FUNDAMENTAL DISCOVERY**:

an increase of the contraction of the anterior leg muscle (fig 40 and 43) cannot increase the upward traction on the pedal during the ascending phase (fig 39) if the tip of the foot is attached to the pedal, the totality of the upward traction on the pedal coming only from the of the iliopsoas thigh muscle (22, fig 40 and 43); consequently, one must eliminate as much as possible the use of the anterior leg muscle by using part 26, fig 44 (and 46), in combination with the platform (21, fig 44 and 46); this **FUNDAMENTAL DISCOVERY** can be explained as follows:

a) the entire world is convinced that the upward traction on the pedal during the ascending phase comes from two sources:

    i- from the contraction of the thigh's iliopsoas muscle which pulls the thigh upwards,

    and

    ii- from the contraction of the anterior leg muscle which pulls the tip of the foot upwards thanks to the strap (24, fig 49),

b) part a) i is true while part a) ii is false, being an optical illusion,

c) this optical illusion can be explained as follows:

    i- the force described in a) ii requires a point of support to be applied, this point of support can only be created by the force described in a) i , this force being used to make the heel into a point of support,

    ii- at the same time, the world-wide interpretation says that the force described in a) i is also used to pull the pedal upwards,

    iii- however, a given force can only have **one single use**; the force applied by the thigh (a, i) is either used to:

1- pull the pedal upwards,

OR

2- makes the hell into a point of support such that the force (a) ii) can be applied,

iv- part iii-1 is true and part iii-2 is false because of a second optical which consists of **NOT** visualize the force that the anterior leg muscle (23, fig 43) applies on the knee (13, fig 43), **this force pulling the knee downward**; indeed, the anterior leg muscle is attached at its **two extremities**: the **lower** point of attachment being located a distance (average) D from the heel (fig 43), and the **upper** point of attachment being the knee (average); therefore, the anterior leg muscle, by contracting, pulls the tip of the foot **upwards**, and **at the same time**, pulls the knee **downwards**: these 2 forces are of equal intensity, **of opposite direction**, and have the same line of action: therefore, **they cancel each other** (as the forces M and M' of fig 22, concerning the calf);

d) the two forces described in iv cancelling each other, it becomes evident that the contraction of the anterior leg muscle (23, fig 43) cannot pull the pedal upwards, and consequently, the totality of the upward traction can only come from the thigh's iliopsoas muscle; therefore, by using part 26, fig 44, the contraction of the anterior leg muscle is avoided, thus allowing:

A- a considerable energy savings without losing propulsive upward traction since the anterior leg muscle, if contracted, could not increase the upward traction on the pedal,

B- the use of the iliopsoas **to its full power**, since, the anterior leg muscle being **much weaker** than the calf, the use of strap 24 **alone** (fig 49), **without** the 2 ropes, imposes a **lower limit** to the upward traction that the iliopsoas can apply,

C- the **power** potentially doubled, since the 2 legs are used **simultaneously**: part 26 (fig 44) during the ascending phase (which eliminates the use of the anterior leg muscle and frees the full power of the iliopsoas) **in addition to** the platform itself during the descending phase (which eliminates the use of the calf), this constitutes the **FUNDAMENTAL DISCOVERY** quoted at the beginning.

END OF CLAIMS

CLAIMS

1- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46), the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal),

the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

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b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel parallel to the platform's surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel (28, fig 45) being in contact with the platform's (21, fig 44 and 46) surface when the shoe (28, fig 45) is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46), this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)), the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is, the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 88) INCLUDES the following technical elements:

T1- an axle (109, fig 87) constituted as follows:

a) the circular part (b, fig 87) of the axle (109, fig 87) rotates freely in part (b, fig 87) at the extremity of the crank which contains roller cylinders (108, fig 87) (usually called roller bearings)
b) the square part of the axle (109, fig 87) is inserted in the square hole at the front of the platform (21) located under the platform,

c) the grooved part (a) of the axle (109, fig 87) is inserted in the grooved part (a) of the toothed cam (104, fig 87), thus allowing:

i) to choose the angle of inclination of the platform (21, fig 87) with respect to the toothed cam (104, fig 87)

ii) to make the toothed cam (104, fig 87), the axle (109, fig 87) and the platform (21, fig 87) integral with each other as if a single rigid part,

T2- a toothed circular wheel (103, fig 87 and 88) welded to crankset casing, this wheel cannot rotate: it is the chain (105, fig 87 and 88) which goes around this wheel (103, fig 87 and 88) when the crankset rotates;

T3- a cam (104, fig 87 and 88) (evidently not circular) having the same number of teeth (therefore same circumference) as the toothed circular wheel (103, fig 87 and 88) being tied together by a traction chain (105, fig 87 and 88) equipped with spring driven chain tensor (106, 107, fig 87 and 88), the position of the cam (104, fig 87 and 88) relative to the axle (109, fig 87 and 88) is chosen to obtain the desired numerical values for the variable angle (, fig 76, 77 and 86);

2- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore of the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46), the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

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B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal),

the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

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2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform's surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel (28, fig 45) being in contact with the platform's (21, fig 44 and 46) surface when the shoe (28, fig 45) is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46),

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this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)), the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 86) INCLUDES the following technical elements:

T1- a part of irregular shape (100, fig 86) being an integral part of the platform (21, fig 86), the lower portion of this part (100, fig 86) being mounted on the inside of the platform (21, fig 86) in a fixed position; the upper portion of the part (100, fig 86) being curved in a manner that, when the upper portion goes back and forth between wheels (102, fig 86), we obtain the desired angle of inclination (angle , fig 86 and fig 76); since the upper portion of the part (100, fig 86) ia always in contact with the two wheels at the same time, it is evident that the portion of the part (100, fig 86) which goes back and forth in between is uniform in width;

T2- two wheels 3 centimeters in radius (102, fig 86), which come to rest on the two borders of part (100, fig 86), these two small wheels (102, fig 86) being tied together by two rectangular parts (101, fig 86) located on each side of the two wheels (102, fig 86) thanks to four axis of rotation (W fig 86, two on each side), the rectangular part (101, fig 86) located between the bike's frame tube and the two wheels (102, fig 86), being mounted by its center to the bike's frame tube thanks to an axis of rotation (Z, fig 86), thus allowing the combined part (101 and 102, fig 86) to rotate around the axis (Z, fig 86) when the crankset rotates, permitting to keep in a tangent (90 degrees) between the two wheels (102, fig 86) and the two rims of part (100, fig 86) on which wheels (102, fig 86) rotate.

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3- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore of the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46), the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal), the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

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this **mechanism to control the angle of inclination** of the platform (21, fig 44) is comprised of:

i) an axis of rotation (59, fig 80) mounted on a collar which is installed in a fixed position around the lower horizontal frame tube supporting the rear wheel,

ii) a crank (53, fig 79 and 80), of the same length as the crankset's crank (112, fig 78) moving in parallel to the crankset's crank (112, fig 78), this crank (53, fig 79 and 80) rotating freely around the axis of rotation (59, fig 80);

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

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4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform's surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel (28, fig 45) being in contact with the platform's (21, fig 44 and 46) surface when the shoe (28, fig 45) is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46), this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)), the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is, the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 79) INCLUDES the following technical elements:

T1- an horizontal part (54, fig 78, 79) tying together the top extremities of the crank (53, fig 79 and 80) and the crankset's crank;

T2- a part (55, fig 80) having a hole with teeth which are inserted in the axis (60, fig 80) having similar teeth at the rotating extremity of the crank (53, fig 80); this part (55, fig 80) is therefore integral with the crank (53, fig 80) and the toothed hole (55, fig 80) allows the choice of the angle between parts (55, fig 80) and (53, fig 80), this angle remaining constant during the mechanism's rotation;

T3- a straight part (57, fig 80) which can be adjusted to the desired position in the slot (or groove) of part (55, fig 80) using a small screw which traverses the sliding element (57, fig 80) and part (55, fig 80), thus allowing to choose the length of the combined part (55 plus 57, fig 80);

T4- a fixed axis of rotation at the extremity of part (57, fig 80) which is inserted in the hole of part (56, fig 80);

T5- a part (58) which can adjusted to the desired length, in a fashion similar to part (55, fig 80), in the slot (or groove) of part (56, fig 80), thus allowing to choose the length of the combined part (56 plus 58, fig 80);

T6- a fixed axis of rotation at the extremity of part (58, fig 80) which is inserted a fixed rotation hole located at the rear of the platform (21, fig 80).

4- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore of the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46), the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal),

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the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

this **mechanism to control the angle of inclination** of the platform (21, fig 44) is comprised of:

a) an axis of rotation (65, fig 81) mounted on a collar (64, fig 81) which is installed in a fixed position around the lower horizontal frame tube supporting the rear wheel,

b) a crank (66, fig 81), of the same length as the crankset's crank (112, fig 78) rotating freely around the axis of rotation (65, fig 81);

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

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2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel (28, fig 45) being in contact with the platform's (21, fig 44 and 46) surface when the shoe (28, fig 45) is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46),

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this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)), the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is, the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 81) INCLUDES the following technical elements:

T1- a toothed cam (67, fig 81), therefore non-circular, which is of the same circumference as that of the circular toothed wheel (62, fig 81), both having the same number of teeth, the said cam (67, fig 81) being soldered on the inside extremity of the axle (65, fig 81), the fixed extremity of the crank (66, fig 81) being soldered to the outside extremity of axle (65, fig 81) in such a way that the cam (67, fig 81), the axle (65, fig 81) and the crank (66, fig 81) are integral with each other: when the crank (66, fig 81) rotates, the cam (67, fig 81) rotates with the crank (66, fig 81), the axle (65, fig 81) which ties them rotating freely at the top of the collar (64, fig 81);

T2- a toothed wheel (62) with its center coinciding with the axis of rotation of the crankset, and which is integral (soldered to) with the crankset's crank, the wheel (62, fig 81) rotating with the crankset's crank (112, fig 78); the toothed cam (67, fig 81) and the toothed wheel (62, fig 81) are put into rotation by a traction chain (63, fig 81) which ties them together;

T3- a rigid rod (68, fig 81) one extremity of which has a rotation joint (70, fig 81) located at the rear and on the inside of the platform (21, fig 81) and the other extremity having another rotation joint (69, fig 81) located at the moving extremity of the crank (66, fig 81).

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5- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore of the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46), the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal), the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

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this **mechanism to control the angle of inclination** of the platform (21, fig 44) is comprised of:

a) an axis of rotation (88, fig 84) mounted ȯn a collar which is installed in a fixed position around the lower horizontal frame tube supporting the rear wheel,

b) a crank (87, fig 84), of the same length as the crankset's crank (112, fig 78) rotating freely around the axis of rotation (88, fig 84);

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 45) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

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4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel being in contact with the platform's (21, fig 44 and 46) surface when the shoe is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46), this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)), the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is, the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 84) INCLUDES the following technical elements:

T1- a rigid part (89, fig 84) having an elbow (in the shape of an inverted **L**), the said part (89, fig 84) comprised of 3 rotation joints (90, 91 and 92, fig 84),

T2- a crank (85, fig 84) one extremity of which rotates freely around one rotation joint (86, fig 84) coinciding with the axis of the bike's rear wheel, but independently of this axis of rotation of the bike's rear wheel (the rotation of the bike's rear wheel having no influence on the crank's (85, fig 84) free movement,

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T3- the rotation joint (90, fig 84) located at the extremity of part (89, fig 84) is mounted on an axis of rotation located at the moving extremity of the crank (85, fig 84),

T4- the rotation joint (92, fig 84) located at the other extremity of part (89, fig 84) is mounted on an axis of rotation located at the platform (21, fig 84) on the inside of the platform (21, fig 84),

T5- the rotation joint (91, fig 84) located on the elbow of part (89, fig 84) is mounted on an axis of rotation located on the moving extremity of the crank (87, fig 84),

T6- the exact triangular position of these 3 rotation joints (90, 91 and 92, fig 84) on part (89, fig 84) are chosen in a manner that, when the crank (87, fig 84) does not make a complete rotation, but rather goes back and forth (angles 1 and 2, fig 84) with respect to the imaginary vertical (V, fig 84).

6- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore of the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46), the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

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B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal), the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

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2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel being in contact with the platform's (21, fig 44 and 46) surface when the shoe (28, fig 45) is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46), this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)),

the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 85) INCLUDES the following technical elements:

T1-a part (93, fig 85) mounted in a fixed position along the lower frame tube supporting the rear wheel, this part (93, fig 85) having a groove inside which a wheel (94, fig 85) can rotate while going back and forth along the groove, the said groove being straight,

T2- a rigid rod (95, fig 85), one extremity of this rigid rod (95, fig 85) bearing a rotation joint mounted on the axis of rotation of the wheel (94, fig 85), the other extremity of the rigid rod (95, fig 85) bearing a rotation joint mounted on an axis of rotation (99, fig 85) located at the rear of the platform (21, fig 85) on the inside,

T3- another rigid rod (96, fig 85) one extremity of which bears a rotation joint (97, fig 85) mounted on an axis of rotation located at the front of part (93, fig 85) just before the beginning of the groove, the other extremity (mobile) of the rigid rod (96, fig 85) also bearing a rotation joint (98, fig 85) mounted on an axis of rotation located in a fixed position on the rigid rod (95, fig 85) at the center of the rigid rod (95, fig 85).

7- A **CRANKSET DEVICE** that comprises:

A) a **platform** (21, fig 44 and 46) supporting the whole of the underside of the shoe (therefore of the foot), an axle (15, fig 44 and 46) mounted under the platform (21, fig 44 and 46), the extremity of this axle being inserted at the end of the crankset's crank (112, fig 44 and 46), where the pedal which has been removed was located before, the said axle (15, fig 44 and 46) being mounted under the platform (21, fig 44 and 46) in a position such that, when the shoe (therefore the foot) is placed on the platform (21, fig 46),

the axis of the said axle (15, fig 46) is directly under the big toe joint (2, fig 46) as is also the case with a conventional pedal, the big toe joint (2, fig 7) being normally placed directly above the axis of rotation (the axle) of the pedal, when the foot is placed in an horizontal position with respect to the ground,

B) a **mechanism to control the angle of inclination** of the platform (21, fig 44) with respect to the ground (variable angle ,fig 76, 77 and 86), which allows the movement of the platform (therefore the foot) to be identical to the normal movement of the foot (variable angle , fig 76) when a pedal is used correctly (the big toe joint (2, fig 7) being directly above the axis of rotation (the axle) of the pedal), the said mechanism for the control of the angle of inclination of the platform (21, fig 44) allowing the choice of the numeric values of angle (fig 76, 77 and 86) in such a way that **the shoe heel is continuously in contact with the platform (21, fig 44 and 46) during the complete rotation of 360 degrees of the crankset**, thus implying:

a) that the platform (21, fig 44) automatically provides **support to the heel** of the shoe during the **descending** phase of the pedalling cycle, when the cyclist **pushes** on the platform (21, fig 44) when his foot goes **downwards towards the front**, starting from the top vertical position of the crank (112, fig 44 and 46) to the bottom (fig 38) vertical position of the crank (112, fig 44 and 46),

b) that the platform automatically provides the possibility of pulling the platform upwards during the **ascending** phase of the pedalling cycle, when the crank (112, fig 44 and 46) goes from the bottom vertical position to the top vertical position when the shoe (the foot) goes upwards from the rear (fig 39), **at the condition that** the shoe is attached to the platform by appropriate technical elements, in order to make possible the upward traction on the crank (112, fig 44 and 46),

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

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2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel (28, fig 45) being in contact with the platform's (21, fig 44 and 46) surface when the shoe (28, fig 45) is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46), this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)),

the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is, the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- the **mechanism to control the angle of inclination** of the platform (21, fig 83) INCLUDES the following technical elements:

T1-a collar (83, fig 83) wrapped around the lower frame tube in a fixed position, this collar (83, fig 83) having a length equal to the cam's width (78, fig 83) as measured along the lower frame tube,

T2- a cam (non-circular) (78, fig 83) bearing a groove along its circumference inside which rotates a wheel (82, fig 83); this cam (78, fig 83) being mounted in a fixed position on the collar (83, fig 83),

T3- the wheel (82, fig 83) rotates on an axis made up of the lower elbowed part of the rod (81, fig 83), the upper elbowed part (81, fig 83) being in the reverse direction from that of the lower elbowed part (which bears the wheel (82, fig 83)), the upper elbowed part of the rod (81, fig 83) being inserted in an axis of rotation (84, fig 83) located at the rear of the platform (21, fig 83), the part elbowed at both ends (81, fig 83) going back and forth inside the cylindrical hole located at the top of part (79, fig 83), this cylindrical hole being integral with part (79, fig 83), this part (79, fig 83) rotating around the fixed axis of rotation (80, fig 83) placed at an appropriate location on the cam (78, fig 83), in a way to obtain the desired numerical values for the variable angle (fig 76, 77 and 86).

8- A **CRANKSET DEVICE** that comprises a **platform** (21, fig 56) supporting the whole of the underside of the shoe,

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

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1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 45) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES **a rigid triangle** one side of which (37, fig 56) is mounted in a fixed position at the rear of the platform (21, fig 56) on the inside, the other side of the rigid triangle (38, fig 56) being mounted in a fixed position at the center of the inside of the platform,

5- IT INCLUDES **an L-shaped rigid part** (40, fig 56) with its vertical portion mounted in a fixed position at the intersection of the sides of the rigid triangle (37, 38, fig 56),

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6- IT INCLUDES **a part** (39, fig 58)**with a hole**, the said part (39) rotating freely in the axis (15, fig 59) of the extremity of the crankset's crank, where the pedal used to be prior to being removed, the vertical portion of the L-shaped rigid part (40, fig 56) being inserted in the hole of the said part (39, fig 58),

7- IT INCLUDES **a weak compression spring** (41, fig 56) inserted along the vertical portion of the L-shaped rigid part (40, fig 56), between the intersection of the sides (37, 38, fig 59) and the top of the hole in the part (39, fig 59), part (39, fig 58) going back and forth by sliding along the vertical portion of the L-shaped rigid part (40, fig 59), as the spring is compressed (41, fig 59) during the descending phase (fig 38) or is released (41, fig 56) during the ascending phase (fig 39),

8- IT INCLUDES **a shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the horizontal portion of the rigid part (40, fig 56) being inserted in the hole (27, fig 45) of the said shoe (28, fig 45), such that the heel of the shoe (28, fig 45) is continuously in contact with the platform (21, fig 56) during the descending (fig 38, 59 and 60) AND ascending (fig 39, 56 and 57) phases, the said hole (27, fig 45) having the same dimensions than horizontal portion of the L-shaped rigid part (40, fig 56), that is the same length and diameter (except for the hole opening), the said hole opening (27, fig 45) being enlarged in the shape of a funnel to facilitate the insertion of the horizontal portion of the rigid part (40 fig 56) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 56).

9- A **CRANKSET DEVICE** that comprises a **platform** (21, fig 72, 73, 74 and 75) supporting the whole of the underside of the shoe (therefore the foot),

the said **CRANKSET DEVICE** being **CHARACTERIZED** as follows:

1- IT INCLUDES **a rear foot positioning guide** (111, fig 78) of 3 centimeters in height located on the inside (the side of the platform closest to the bicycle frame) of the platform (21, fig 78) a few centimeters from the rear, mounted such that the shoe heel can touch it, the foot being retrieved towards the outside of the platform (21, fig 44 and 46), as in the case of a pedal,

2- IT INCLUDES a **forward foot positioning guide** (110, fig 78) of 3 centimeters in height located on the inside of the platform (21, fig 78), having a curved shape and mounted is a manner such that the part of the shoe which holds the big toe touches this guide over a distance of a few centimeters along the forward inside part of the shoe and over a distance of a few centimeters along the front part of the shoe, just ahead of the part of the shoe holding the big toe,

3- IT INCLUDES a **rigid part** (25, fig 44 and 46, and 25, fig 75), matching the shape of the shoe (fig 44 and 46), mounted in a fixed position on the inside of the platform, the curvature of this part (25, fig 44 and 46) being the same as that the shoe such that the shoe, once positioned on the platform (21, fig 44 and 46), is maintained in a fixed position (the heel touching the platform), the position of the shoe (28, fig 45) which is in contact with the part (25, fig 44 and 46) being that is near the intersection of the shoe and the leg over a distance of 5 centimeters, the part (25, fig 44 and 46) being slightly curved upwards at its top extremity to facilitate the insertion of the shoe (28), the part (25, fig 44 and 46) not covering the outside of the foot such that the retrieval of the foot can be achieved as easily as retrieving the foot towards the outside from the pedal,

4- IT INCLUDES an **axle** (26, fig 44) AND a **shoe** (28, fig 45) **with a hole** (27, fig 45) **in the heel**, the said axle (26, fig 44) having 5 centimeters in length, being mounted in a fixed position on the rear foot positioning guide (111, fig 78) parallel to the platform surface (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) which is mounted under the platform (21, fig 44 and 46), the said axle (26, fig 44) being mounted at a height from the surface of the platform (21, fig 44 and 46) such that, when the cyclist positions his shoe (28, fig 45) on the platform (21, fig 44 and 46), the said axle (26, fig 44 and 46) can be inserted in the hole (27, fig 45) of the shoe's heel (28, fig 45), the shoe's heel being in contact with the platform's (21, fig 44 and 46) surface when the shoe is in its final position, i.e. when the axle (26, fig 46) is fully inserted in the hole (27, fig 45) of the shoe (28, fig 45), the axis of the said axle (26, fig 46) being located exactly underneath the rotation joint of the ankle (1, fig 46) when the foot is in horizontal position (fig 46),

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this hole (27, fig 45) in the shoe (28, fig 45) also being parallel to the surface of the platform (21, fig 44 and 46) and parallel to the axle (15, fig 44 and 46) when the shoe (28, fig 45) is in its final position on the platform (21, fig 44 and 46) (the axle (26, fig 46) being fully inserted in the hole (27, fig 45)), the said hole (27, fig 45) having the same dimensions as the axle (26, fig 44), that is, the same length and the same diameter, except for the hole (27, fig 45) opening being enlarged in the shape of a funnel to facilitate the insertion of the axle (26, fig 44 and 46) in the hole (27, fig 45) when the cyclist places his shoe (28, fig 45) on the platform (21, fig 44 and 46),

5- IT INCLUDES **an uneven Z-shaped rigid part** (fig 74) mounted in a fixed position under the platform (21, fig 74) and is integral with the platform,

6- IT INCLUDES **a rectangular base** (50, fig 72 and 73), the said rectangular base having 2 vertical rigid rods (s1 and s2, fig 72 and 73) mounted in a fixed position at the front of the rectangular base (50, fig 72 and 73), two other rigid vertical rods (s3 and s4, fig 72 and 73) being mounted in a similar fashion immediately at the rear of the platform, and also two more (s5 and s6, fig 72 and 73) again being mounted in a similar fashion at the rear of the rectangular base (50, fig 72 and 73), each of these pairs of rods (s1 + s2, s3 + s4, s5 + s6) bearing at their top extremity a horizontal axis of rotation on which are mounted 2 gear wheels in fixed positions (44 and 47 for s1 + s2, 46 and 48 for s3 + s4, 51 and 52 for s5 + s6, fig 73), each of these pairs of gear wheels being integral with each other (they rotate together), a traction chain (ch47, fig 73) tying the gear wheels (47 and 52, fig 73) together, another traction chain (ch48, fig 73) tying together the gear wheels (48 and 51, fig 73), the rear wheel of the bike (symbolized by wheel 49) rotating (always in the same direction) when one or the other of the two gear wheels (51 or 52. fig 72 and 73) rotates, the gear wheels (51 and 52, fig 72 and 73) always rotating in the same direction,

7- IT INCLUDES **four steel rods** (t1, t2, t3 and t4, fig 72 and 73) mounted vertically on the base (50, fig 72 and 73) in a fixed position (in a rectangular position as seen from the top, a rod at each corner of a rectangle),

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8- IT INCLUDES **a steel cubic form** (hollow) (42, fig 72 and 73), the said cubic form having 4 rectangular holes (one at the top, one at the bottom, another at the front and the last one at the rear) together with 4 vertical holes on the 4 corners from top to bottom vertically, in these 4 holes are inserted the 4 steel rods (t1, t2, t3 and t4, fig 72 and 73), the steel cubic form (42, fig 72 and 73) being able to slide freely (up and down) along the four steel rods (t1, t2, t3 and t4, fig 72 and 73), the uneven Z-shaped rigid part (21, fig 74) going back and forth (up and down) inside the steel cubic form (42, fig 72 and 73) thanks to the 2 rectangular holes drilled at the top and bottom of the steel cubic form (42, fig 73), two springs (r1 and r2, fig 72) being inserted in the two vertical portions of the uneven Z-shaped part attached under the platform (fig 74), these two springs (r1 and r2) being alternatively compressed and released as the uneven Z-shaped part fixed under the platform goes back and forth up and down inside the steel cubic form (42, fig 72 and 73),

9- IT INCLUDES **a T-shaped part** (43, fig 72) with its vertical portion bearing gear teeth which can be inserted in those of the wheel (44, fig 73), the horizontal portion of the part (43, fig 72) being able to slide back and forth in the hole on the front side of the cubic form (42, fig 72) and bears a compression spring (r3, fig 72) which maintains the vertical portion of part (43, fig 72) pressing against the side of the cubic form (42, fig 72) when the inclined portion of this part (43, fig 72) is not in contact with the inclined portion of the uneven Z-shaped part attached under the platform (fig 74),

10- IT INCLUDES **a T-shaped part** (45, fig 72) with its vertical portion bearing gear teeth which can be inserted in those of the wheel (46, fig 73), the horizontal portion of the part (45, fig 72) being able to slide back and forth in the hole on the front side of the cubic form (42, fig 72) and bears a compression spring (r4, fig 72) which maintains the vertical portion of part (45, fig 72) pressing against the side of the cubic form (42, fig 72) when the inclined portion of this part (45, fig 72) is not in contact with the inclined portion of the uneven Z-shaped part attached under the platform (fig 74).

END OF CLAIMS

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